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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/693,108	10/24/2003	Patrick M. Turnmire	STEP017	1638

34496 7590 02/14/2007
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2775 NW 126TH AVE
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EXAMINER

ENSEY, BRIAN

ART UNIT	PAPER NUMBER
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2615

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/14/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/693,108

Applicant(s)

TURNMIRE ET AL.

Examiner

Brian Ensey

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 December 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-49 is/are pending in the application.
- 4a) Of the above claim(s) 5-8, 11-14, 16, 25-32 and 35-49 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 9, 10, 15, 17-24, 33, 34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

Applicant's election of Species I, claims 1-4, 9, 10, 15, 17-24, 33 and 34 in the reply filed on 12/08/06 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4, 9, 10, 15 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takewa et al. U.S. Patent Application Publication 2002/0061117 in view of Menasco Jr. et al. U.S. Patent No. 5,748,758 and further in view of Tillotson et al. U.S. Patent No. 5,275,796.

Regarding claims 1 and 2, Takewa discloses an electromagnetic transducer comprising: a motor structure (11,13) including a magnetic air gap (12); a voice coil (7) disposed within the magnetic air gap; and a diaphragm (42) coupled to the voice coil (See Fig. 4 and paragraphs 0054, 0055, 0057). Takewa further teaches the diaphragm is made of resin material including polystyrene or ABS (See paragraph 0055). Takewa does not expressly disclose the diaphragm wherein the diaphragm has an overall mass density lower than 0.005 g/cm^3 . However, the use of

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nanoporous materials for speaker diaphragms is well known in the art and Menasco Jr. teaches an audio transducer utilizing a nanoporous (aerogel) diaphragm (See Figs. 1-10 and col. 3, line 66 to col. 4, line 21). Tillotson teaches making aerogel with a density of less than 0.003g/cm^3 which can be used in the making of microspeakers (See abstract and col. 1, lines 15-23 and 51-59). Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention to replace the resin diaphragm of Takewa with the nanoporous diaphragm of Menasco for a light diaphragm with an overall mass density of less than 0.005 g/cm^3 for exceptional impedance matching to ambient air as compared to a conventional diaphragm (See Menasco col. 4, lines 27-39).

Regarding claims 3 and 4, the combination of Takewa in view of Menasco, Jr. in further view of Tillotson further discloses the diaphragm comprises a nanoporous material and further comprises at least one of aerogel, solgel, and nanocomposite material (See Menasco abstract).

Regarding claims 3 and 4, the combination of Takewa in view of Menasco, Jr. in further view of Tillotson further discloses the diaphragm comprises one of a sphere, a hemisphere (See Takewa Fig. 4), a less than hemispherical section of a sphere, a silo shape, and a filled cone shape.

Regarding claim 10, the combination of Takewa in view of Menasco, Jr. in further view of Tillotson further discloses a bobbin coupled to the diaphragm and to the voice coil (See Takewa Fig. 4 and [paragraphs 0057-0059]).

Regarding claim 15, the combination of Takewa in view of Menasco, Jr. in further view of Tillotson further discloses an audio tweeter and wherein the diaphragm comprises a dome shape (See Takewa Fig. 4 and paragraphs 0002 and 0004).

Regarding claim 17, the combination of Takewa in view of Menasco, Jr. in further view of Tillotson further discloses the electromagnetic transducer configured as a microphone (See Menasco Jr Fig. 10 and col. 18, lines 13-15).

Claims 18-23, 24, 33 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takewa et al. U.S. Patent Application Publication 2002/0061117 in view of Menasco Jr. et al. U.S. Patent No. 5,748,758.

Regarding claim 18, Takewa discloses an electromagnetic transducer comprising: a motor structure (11,13); a suspension component (44b) coupled to the motor structure; and a diaphragm (42) coupled to the suspension component (See Fig. 4 and paragraphs 0054, 0055, 0057). Takewa further teaches the diaphragm is made of resin material including polystyrene or ABS (See paragraph 0055). Takewa does not expressly disclose the diaphragm comprises more than 50% by volume a nanoporous material. However, the use of nanoporous materials for speaker diaphragms is well known in the art and Menasco Jr. teaches an audio transducer utilizing a nanoporous (aerogel, 100% by volume) diaphragm (See Figs. 1-10 and col. 3, line 66 to col. 4, line 21). Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention to replace the resin diaphragm of Takewa with the nanoporous diaphragm of Menasco for a light diaphragm for exceptional impedance matching to ambient air as compared to a conventional diaphragm (See Menasco col. 4, lines 27-39).

Regarding claims 19-22, the combination of Takewa in view of Menasco further discloses the diaphragm comprises more than 75% by volume, more than 90% by volume, more than 95% by volume and more than 99% by volume a nanoporous material (The combination

teaches a diaphragm composed of aerogel and therefore 100% by volume of nanoporous material, See Menasco col. 4, lines 8-15).

Regarding claim 23, the combination of Takewa in view of Menasco further discloses the nanoporous material comprises aerogel (See Menasco abstract)

Regarding claim 24, Takewa discloses a tweeter audio speaker comprising: a motor structure (11) having a magnetic air gap (12); a diaphragm (42) including a substantially solid dome (dome is one solid piece with no hole or protrusions, see Fig. 4); and a voice coil (7) coupled to the diaphragm and disposed within the magnetic air gap (See Fig. 4 and paragraphs 0054, 0055, 0057). Takewa further teaches the diaphragm is made of resin material including polystyrene or ABS (See paragraph 0055). Takewa does not expressly disclose the diaphragm is a nanoporous material. However, the use of nanoporous materials for speaker diaphragms is well known in the art and Menasco Jr. teaches an audio transducer utilizing a nanoporous (aerogel) diaphragm (See Figs. 1-10 and col. 3, line 66 to col. 4, line 21). Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention to replace the resin diaphragm of Takewa with the nanoporous diaphragm of Menasco for a light diaphragm for exceptional impedance matching to ambient air as compared to a conventional diaphragm (See Menasco col. 4, lines 27-39).

Regarding claim 33, the combination of Takewa in view of Menasco further discloses the dome has a shape comprising one of spherical, hemispherical (See Takewa Fig. 4), sub-hemispherical, silo-shaped, and filled cone.

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Regarding claim 34, the combination of Takewa in view of Menasco further discloses the nanoporous material comprises at least one of aerogel (See Menasco abstract), solgel, and nanocomposite material.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian Ensey whose telephone number is 571-272-7496. The examiner can normally be reached on Monday - Friday 6:30 AM - 3:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sinh Tran can be reached on 571-272-7564. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Brian Ensey
Examiner
February 12, 2007